

SMC

Specs & Standards

Initiative

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THIN THE PARTY OF THE STATUS CHIEF

Background

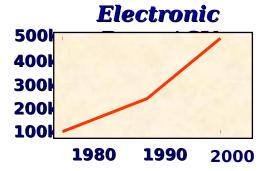
- Several Billion \$\$ in Lost Assets During the 1990s/early 2000's
- Reduced Government and Contractor Mission Assurance
 - \$\$ and engineering resources
- The 90's Saw a Number of Interrelated "New Directions" for the Development of Space Systems
 - <u>DoD</u> "Acquisition Reform"
 - Reduced reliance on specs/standards
 - Deferred largely to commercial "best practices"

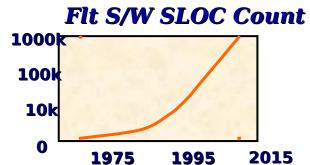
Acquisition Practices of the 1990s Were Inherently Fla



Industry-Wide Technical Issues

- System Complexity, in an Absolute Sense, Continues to Increase in Magnitude and Scope
 - Parts
 - Hardware
 - Software
 - Interfaces





- Increased Complexity Also Results in:
 - More latent defects (increased late build-cycle and orbital failures)
 - Greater test challenges related to changes in technology, manufacturing and materials
 - Increasing electronic part or device complexity (e.g., ASIC, FPGA)
 - Increased use and complexity of software
 - System design and sub-system complexity
 - Ability and willingness to "test like you fly"

Satellites Today Face a Greater Challenge to Verify

Full Performance and Screen for Defects Prior to



Specs & Standards Initiative

- Apply specs & standards as element of acquisition practices and toolset
 - Define technical practices and expectations by government
 - •Define the "what" and not the "how to"
- Establish "Select" list of space systems standards
 - Establish baseline set of common specs and standards
 - Include military and industry (e.g., AIAA, ISO) standards
- Establish Organizational Policy
- Specify critical standards in RFP
 - Compliance Documents
 - Baseline contractually



SMC S&S Policy

- Issued by Lt.Gen. Hamel 11 July
- Establishes specifications and standards as an integral element of SMC acquisition processes
- Applies to all new development, acquisition and sustainment contracts, including new contracts for legacy programs
- Contractual compliance through the supplier chain, as appropriate
- SMC Chief Engineer (CE) responsible for master list of compliance documents
- SPO's, with CE, generate tailored set of specs and standards and recommend to PEO for implementation
- SMC/CC/AFPEO Space resolves issues



DEPARTMENT OF THE AIR FORCE

HEADQUARTERS SPACE AND MISSILE SYSTEMS CENTER (AFSPC)
LOS ANGELES, CA

JUL 1 1 2006

MEMORANDUM FOR SMC-ALL

FROM: SMC/CC

SUBJECT: Initial Policy on Specifications and Standards Usage at SMC

- This policy establishes the use of specifications and standards as an integral element of SMC
 acquisition processes. Programs executed by SMC/AFPEO-Space shall include specifications
 and standards in all solicitations and shall place them on contract as compliance documents
 through the supplier chain, as appropriate.
- 2. The SMC Chief Engineer shall be responsible for defining, coordinating, maintaining, updating and reporting the master list of compliance documents. The list includes the minimum essential government, industry, professional and international specifications and standards for SMC's total portfolio of launch vehicles, space vehicles, ground systems, user equipment, missile systems, facilities and research. This policy applies to all new SMC/AFPEO-Space development, acquisition and sustainment contracts, including new contracts for legacy programs. For existing programs and contracts, the SPO's, with the SMC Chief Engineer, will assess the program, status, requirements, technical baseline and risks to generate a tailored subset of specifications and standards. This subset will be recommended to SMC/CC/AFPEO-Space for implementation. The necessary specifications and standards will be placed on contract, as part of the program's baseline and the Program Office shall enforce them. Any issues on specifications, standards or implementation that arise between SMC/EA and SPD's will be brought forward to SMC/CC/AFPEO-Space for resolution.
- 3. The Chief Engineer shall prepare an SMC OI to institutionalize the practice and intent of this policy.

MICHAEL A. HAMEL Lieutenant General, USAF Commander

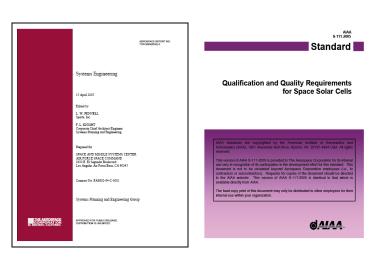


SMC S&S List

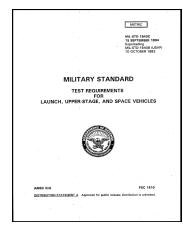
Revised SMC S&S List published 8/9/2007

- 65 essential documents
 - Entire SMC System Portfolio
- Military,
 International, and
 Industry Standards,
 and Aerospace TORs
- Updated standards to reflect current best practices
- Additional updates to current document versions

Functional/ Technical Area	Document Number	Title	Ph.		Comments							
Configuration Management	TOR-2006(8583)-1	Configuration Management	15-Aug				1					
Confamination	ASTM E 1548-03	ASTM E1545, Standard Pt Preparation of A Control Plans	actice for		and the spinners below shift for below the world for warrants or		-					
Design Reviews	ML STD 15218 Notice 3	Technical Revie Equipment and	Functional/	Document		Pub	Tech					
Electrical Power	TOR-2005(8583)-2	Electrical Power Space Vehicle D	Technical Area	Number	Title	Date	POC	Co	mments			
Electrical Power	DOD-W-8387SA Rev A Notice	Opade Venice L Wring Hamess, Testing	22 Logistics	MIL-STD-1367A	Packaging, Handling, Storage, and fransportability Program Requirements for Systems and Equipments	1-045-89	Duphilly, R Aerospace					
Electrical Power, Batteries			23 Logistics	TM-86-01	Air Force Technical Manual Contract Requirements (TMCR)	1-Jun-97	Duphilly, R. Aerospace	Falloring available from SMC/LGA				
Electrical Power, Solar Cells	AIAA 585-111 2005	Qualification and Space-Qualified	24 Logistics	MIL-PRF-295128	Training Data Products	31-Aug-01	Dupnity, R. Aerospace	Talloring available from SMC/LGA				
Electrical Power, Solar Panels Electromagnetic	AMA 000 0-112 2000	Qualification and Space-Qualified	25 Maintainability	MIL-GTD-4708	Maintainability Program for Systems and Equipment	1-Jun-95	Dupnity, R					
Interferencer Compatibility Electromagnetic	TUR-QUUQ(0003)-T	Electromagnetic For Space Equip Electromagnetic	Manufacturing Management / Products life	MIL-GTD-1528A	Production Management	B	nctional/	Document		Pub	Tech	
Interference/ Compatibility	MIL-STD-461E	Requirements to Electromagnetic	27 Mass Properties	TOR-2005 (8583)-3970	Mass Properties Control Standard f	Teel	nnical Area	Number	Title	Date	POC	Comments
Electromagnetic		EMC Grounding	Moving Mechanical		Moving Mechanical Assemblies for	47 Safety, S	ratem	MIL-STD-882C	System Safety Program Requirements	19-Jan-93	Huang, L. SMC/SE	Version D is most current; SMC/SE requires Version C to be used on SMI contracts.
Compatibility		Dystem Facilities	Assemblies	AIAA S-114-2005	Lauren Venices Criteria for Explosive Systems and	48 Saketito I	Dispossi	TOR-2006 (8583)-4474	Requirements for End-of-Life Disposal of Satellifes Operating at Geosynchronous Attitute	3-Nov-05	Allor, W. Aerospace	
Occupational Health		Hazardous Mata	30 Ordnance 31 Parts Management	ANA 5-113-2005 ANGL/ ANA R-100A	Used on Space and Launch White Recommended Practice for Parts Wanagement	49 Security		DeD 8610.1-M	DoD information Technology (IT) Security Certification and Accreditation (CSA) Proc	ess 31-Jul-00	Dupule, J. Aerospace	Tatioring to generate requirements language available from SMC/PIP
Human Factors		DoD Design Crit Engineering	32 Parts Management	TOR -2004/39091-3315 Rev. A	Parts, Materials, & Processes Conti			DeDI 8900.2	(DITSCAP) Application Manual	06-Feb-03	Duguis, J.	
Human Pactors	150 9241	Eroonomio Regu	33 Parts Management	TOR-2004(3909)-3316 Rev. A	Program for Space Ventores - Revis Technical Requirements for Electro Materials, and Processes Used in 1	50 Security		DBDI 8600.2	Information Assurance Implementation	_	Aerospace	Talloring to generate requirements language available from SMC/PIP
Human Pactors	150 9241	Misual Display Ü Common Operal	ST THE MAINING THE REAL PROPERTY.		Vesicles - Revision A Parts, Materials, and Processes Co	51 Security		DOOD 5200.39	Security, Intelligence, and Counterintellige Support to Acquisition Program Protection		Dupuis, J. Aerospace	Tationing to generate requirements language available from SMC/PIP
Human Factors	COE UIS Rev 4.3	Interface Specifi (CM Reference:	34 Parts Management	TOR-98(1412)-1 Rev A	Program for Expendable Launch Vo Revision A	Security		MIL-HDBK 1785A	System Security Engineering Program Management Requirements	1-Aug-95	Dupuis, J. Aerospace	Talloring to generate requirements language available from SMC/PIP
Human Factors	SMCIAXE Rpt # HMRB-2001-1	Standard Fractic Display Convent	35 Proceurized Handware	AIAA 0-080-1998	Space Systems, Metallic Pressure 1 Pressurtzed Structures, and Pressu	53 Security		DCID 6/3 Manual	Protecting Sensitive Compartmented Information Within Information Systems	11-Dec-03 Written for	Cupurs, J. Aerospace	Tatioring required to generate contractor requirements for portions of the system processing SCI. Available from SMCIPIP
Human Factors		Operations Electric Industrie Bulletin - Human	M Pressurized Hardware	AIAA S-081A-2000	Components AIAA Standard for Space Systems Composite Ovenerapped Pressure	54 Security		TSRD	Telecommunications Security Requirement Document	each application	Cupuis, J. Aerospace	NSA-provided, system specific document that specifies requirements for cryptography and key management.
interoperability/		Practices, Ver. 1 DoD Architecture	7.4800 242 101000	AND SCHOOL SCHOOL	(COPVs)	50 Software	Development	ISO/IEC STD 15939	Software engineering Software Measurement Process	11-Jul-02	Zambrana, M. SMC/EAS	
Standardization			37 Pressurized Hardware	TOR-2003 (8583)-2896	Space Systems – Flight Pressurtzer		Development	RTCA-00-278	Guidelines For Communication, Navigation Surveillance And Air Traffic Management	5-8691-02	Zambrana, M.	Applicable to AIRBORNE systems only.
Standardization		DISR Baseline F Logistics Warrag	20 Pressurized Handware	TOR-2003(8583)-2895 Rev. 1	Solid Rocket Motor Case Design & Requirements	sorteare	Development	RTUA-00-278	(CNSIATM) Systems Software Integrity Assurance - DO-278		SMC/EAS	Approace to Amburtine systems only.
Logistics		1365-1A)	39 Product Assurance	SAE ASS100 Rev. B	Guality Systems - Aerospace - Mod Guality Assurance in Design, Devel	57 Software	Development	RTCA-DO-1788	Software Considerations in Airborne Syste and Equipment Certification	1-040-92	Zambrana, M. SMC/EAS	Approatise to AIRBORNE systems only.
Logistics	MIL-STD-130M	Identification Ma	40 Program Management	SO 14300-2	Production, installation and Service Space Systems Programme Manag Part 2: Product Assurance - Police i		Development	TOR-2004(3909)-3537 Rev B	Software Development Standard for Space Systems Space Systems — Structures, Structural	11-100-00	Zambrana, M. SMC/EAS	
•					Principles Space Systems - Program Manage	Structure		AIAA S-110-2005	Components, and Structural Assemblies	12-Jul-05	Chang, J.B. Aerospace	Talloring available from POC
			41 Program Management		1: Structuring of a programme	60 Structure	e, Loade	TOR-2003(8583)-2886	Independent Structural Loads Analyses of integrated Spacecraft, Laurich Vervole	22-Aug-03	Kabe, A. Aerospace	
			42 Program Management 43 Reliability Program	EIA 748 MIL-STD-15438		61 Survivabi	lity	TOR-92(2904)-5	Systems Sunnvability Program Management Requirements For Space Systems	1-Jan-93	Cuevas, G. Aerospace	
			44 Reliability Program	MIL-GTD-19438 MIL-GTD-765B, Notices 1 8 2	and Laurich Vehicles Respects Drovings for Systems and	€ Systems	Engineering	TOR-2005 (8583) -3 Rev. A	Systems Engineering Requirements and Products	29-Sep-05	Stay, B.	Significantly revised to specify SE requirements and products; varidated to be ELA 632 and IEEE 1220 compilant.
			45 Ray Management	DO 17666	Equipment Development and Procu Space Systems - Risk Management	63 Test, Gro		MIL-STD-1833	Test Requirements for Gnd Equipt & Assor Computer S/W Sptng Space Venicles	0 4-May-98	Maynard, R. Aerospace	per con con and made rates compraint.
			45 Safety, Range	APSPCMAN 91-710	Range Safety Liser Requirements &	test. Gro		MIL-STD-810P	Department of Defense Test Nethod Stand for Environmental Engineering Considerati		Davis, D. SMC/EAE	Applies to vehicle mountings, or ground support in various environments



Compliance Documents for SMC Acquisitions dated 08/08/06





Standards Technical/Functional Areas

- Program Management
- Systems Engineering
- Risk Management
- Configuration Management
- Design Reviews
- Product Assurance
- Electrical Power
- Electrical Power, Batteries
- Electrical Power, Solar
- EMI / EMC
- Environmental Engineering
- Human Factors
- Interoperability
- Logistics
- Parts Management/Engr

- Ordnance
- Pressure Vessels
- Reliability
- Maintainability
- Manufacturing / Producibility
- Mass Properties
- Safety
- Security
- Software Development
- Structures
- Survivability
- Moving Mechanical Assemblies (MMAs)
- Test, Ground
- Test, Space



National Security Space



Space Industrial Base Council

Collaboration Across National Security Space

Consistency NSS

Co-Chaired by DoD EA Space & DNRO Integration
Space
Industrial Base
Council

Council
"Bring Senior Level Attention to Space
Industrial Base Issues on a Recurring
Basis

and

Bring Forward 'Actionable' Recommendations Across the Full Range of <u>Industrial Base Issues.</u>"

Specs & Stds Working Group

- Ensure sound technical practices applied on NSS programs and facilitate industrial supply base consistent with requirements
- Ensure NSS community takes a consistent approach in the application of specs & standards
- SMC; NSSO; NRO; Navy; NASA; MDA;

Ensuring

SMC / NRO

Collaboration
Mission Assurance
Integration Task
Force

Co-Chaired by NRO DDSE & SMC/EA

"Identify and implement areas where a common SMC / NRO approach provides benefit."

Specs & Stds Working Group

- Establish a common set of preferred specifications and standards
 - Aerospace representative on NRO Standards Advisory Panel (NSAP)



Industry Standards Completed

- 7 AIAA Standards recently issued under SMC effort
 - Moving Mechanical Assemblies for Space and Launch Vehicles, S-114-2005
 - Criteria for Explosive Systems and Devices Used on Space and Launch Vehicles, S-113-2005
 - Qualification and Quality Requirements for Space-Qualified Solar Cells, S-111-2005
 - Qualification and Quality Requirements for Space-Qualified Solar Panels, S-112-2005
 - Space Systems-Structures Design and Test Requirements, S-110-2005
 - Mass Properties Controls for Space Systems, S-120-2006
 - Electrical Power Systems for Unmanned Spacecraft, S-122-2007



SMC / Contractor

S&S initiatives

AFSO21



S&S Problem Stateme

- •No mutual understanding of contractor and SMC Specs and Standards (S&S) processes
- Differing requirements from different SMC customers
- Contractor labor intensive efforts to correlate command media (CM) to government S&S
- Difficulty in tracking changes in S&S
- Persistent contractor push back on implementation of S&S
- Lack of feedback on contractor comments on S&S



Objectives/Goals

- Review & modify current processes:
 - Provide documented processes which facilitate the development, modification, and implementation of the SMC Compliance S&S and Contractor command media programs
 - Provide documented contractor processes which facilitate understanding of relationship (verifiability) of contractor command media and SMC Compliance Standards
 - Improve both government and contractor S&S processes to facilitate



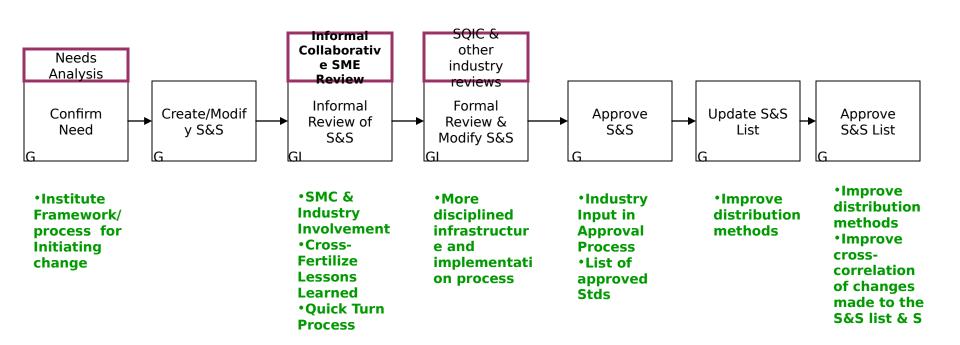
S&S Scope

- Project Focused on SMC and Contractor Processes
 - Process 1: Development and Modification of S&S
 - Process 2: Contractor Compliance with S&S
 - Process 3: Pre-award S&S Tailoring
 Process
- Focused on Competitive Procurement versus Sole Source

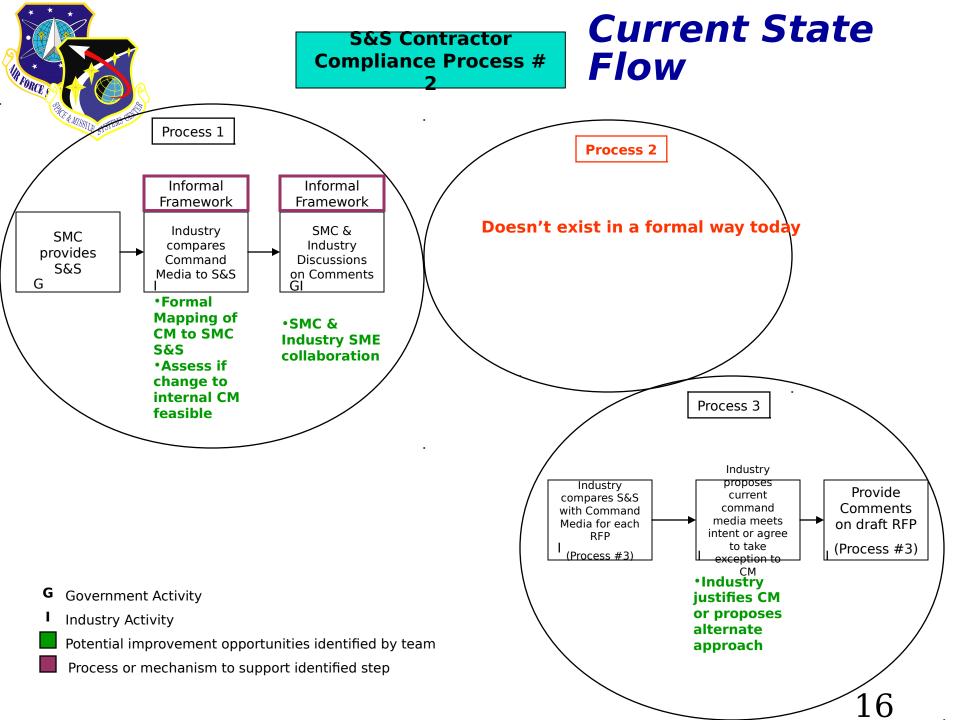


Current State

Spec & Std
Development and/or
Modification
Process #1



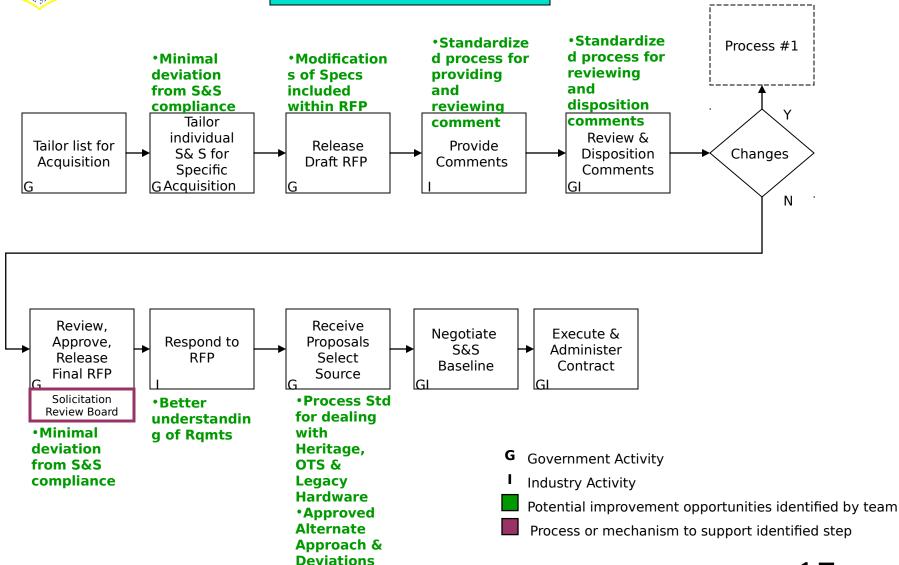
- **G** Government Activity
- I Industry Activity
- Potential improvement opportunities identified by team
- Process or mechanism to support identified step

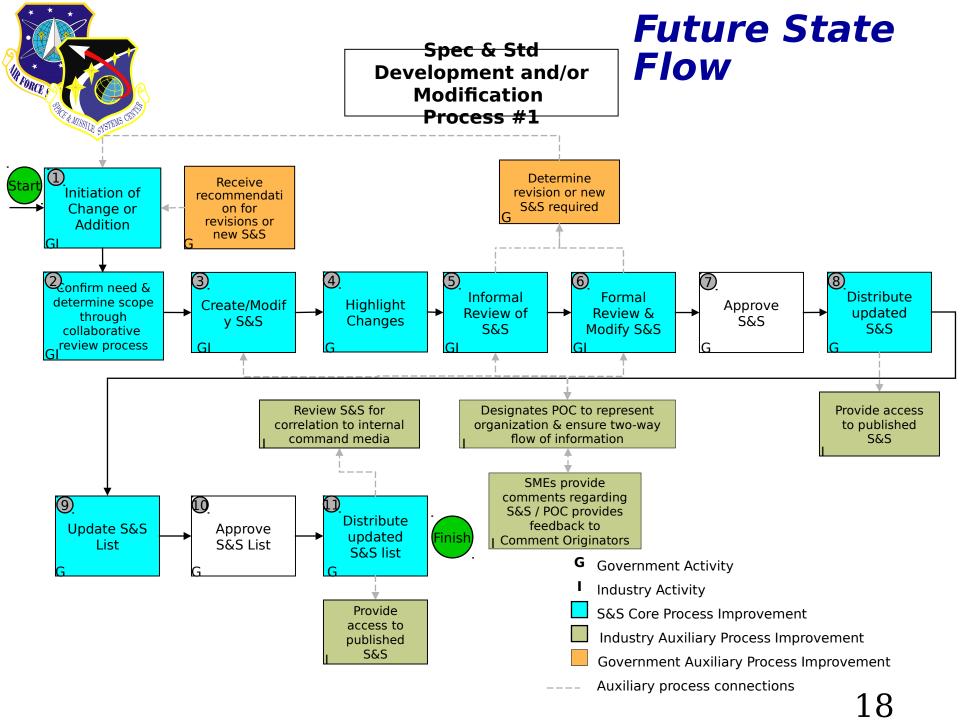




Current State

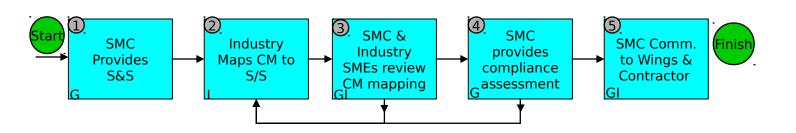
Pre-Contract Spec & Std Tailoring Process #3



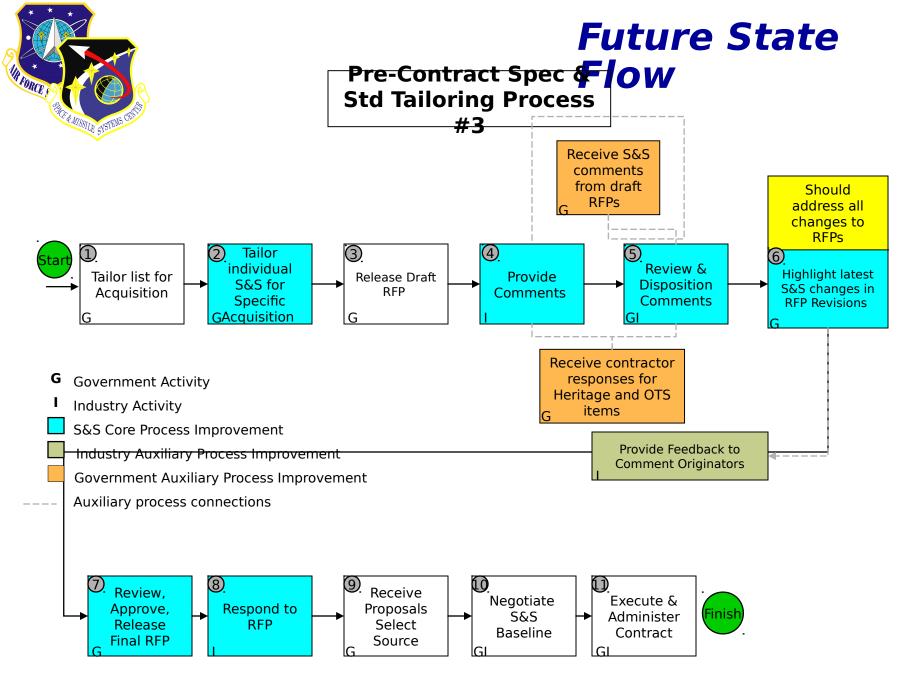




Future State Flow Contractor Compliance Process #2



- **G** Government Activity
- I Industry Activity
- S&S Process Improvement
- Industry Auxiliary Process Improvement
- ---- Auxiliary Process Connections





Summar y

- S&S Infrastructure and Institutionalization on both sides critical for success
 - Infrastructure
 - Policies, organizational structure, roles responsibilities
 - Institutionalization
 - Disciplined implementation
 - Minimize "Waivers/Deviations"
- Government must implement across all programs.....and acquisition agencies
- Industry must implement across programs